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U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

000500-337

U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.5)

10/070471

INTERNATIONAL APPLICATION NO.
PCT/SE00/01720

INTERNATIONAL FILING DATE
06 September 2000

PRIORITY DATE CLAIMED
09 September 1999

TITLE OF INVENTION

A SANITARY NAPKIN WHOSE REAR PORTION INCLUDES A LONGITUDINALLY EXTENDING RIDGE

APPLICANT(S) FOR DO/EO/US

Ann SAMUELSSON

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:


1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☒ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ is attached hereto.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).(executed)
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A FIRST preliminary amendment.
14. ☐ A SECOND or SUBSEQUENT preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. ☒ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information: International Preliminary Examination Report; International Search Report; Written Opinion; and Response to Written Opinion



21839

U.S. APPLICATION NO. (If known, see 37 CFR 1.415) 10/070471		INTERNATIONAL APPLICATION NO. PCT/SE00/01720		ATTORNEY'S DOCKET NUMBER 000500-337	
21. <input checked="" type="checkbox"/> The following fees are submitted:				CALCULATIONS	PTO USE ONLY
Basic National Fee (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1,040.00 (960) International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00 (970) International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00 (958) International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00 (956) International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00 (962)					
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$ 1040.00	
Surcharge of \$130.00 (154) for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492(e)). 20 <input type="checkbox"/> 30 <input type="checkbox"/>				\$	
Claims	Number Filed	Number Extra	Rate		
Total Claims	12 -20 =	0	X\$18.00 (966)	\$	
Independent Claims	2 -3 =	0	X\$84.00 (964)	\$	
Multiple dependent claim(s) (if applicable)			+ \$280.00 (968)	\$	
TOTAL OF ABOVE CALCULATIONS =				\$ 1040.00	
Reduction for 1/2 for filing by small entity, if applicable (see below).				+	\$
SUBTOTAL =				\$ 1040.00	
Processing fee of \$130.00 (156) for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492(f)). 20 <input type="checkbox"/> 30 <input type="checkbox"/>				\$	
TOTAL NATIONAL FEE =				\$ 1040.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 (581) per property				+	\$ 40.00
TOTAL FEES ENCLOSED =				\$ 1080.00	
				Amount to be refunded:	\$
				charged:	\$
a. <input type="checkbox"/> Small entity status is hereby claimed. b. <input checked="" type="checkbox"/> A check in the amount of \$ 1080.00 to cover the above fees is enclosed. c. <input type="checkbox"/> Please charge my Deposit Account No. 02-4800 in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed. d. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-4800. A duplicate copy of this sheet is enclosed.					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO: Ronald L. Grudziecki BURNS, DOANE, SWECKER & MATHIS, L.L.P. P.O. Box 1404 Alexandria, Virginia 22313-1404 (703) 836-6620					
			 SIGNATURE William C. Rowland NAME 30,888 REGISTRATION NUMBER March 7, 2002 DATE		

Patent
Attorney's Docket No. 000500-337

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of)	
)	
Ann SAMUELSSON)	Group Art Unit: Unassigned
)	
Application No.: Unassigned)	Examiner: Unassigned
)	
Filed: March 7, 2002)	
)	
For: A SANITARY NAPKIN WHOSE)	
REAR PORTION INCLUDES A)	
LONGITUDINALLY EXTENDING)	
RIDGE)	
)	

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination of the above-captioned patent application, please enter the following amendment.

IN THE CLAIMS:

Please amend claims 1-12 as follows:

1. (Amended) An absorbent article comprising a front portion, a rear portion, a liquid-permeable top sheet, a liquid-impermeable backing sheet, and an absorbent body enclosed between the top and backing sheets, wherein the rear portion of the article includes a longitudinally extending ridge-shaped elevation that projects out from the side of the article that contains the top sheet,

wherein a central string of material extends in the rear portion of the article; and

the top sheet, the backing sheet and the absorbent body enclosed therebetween in the rear portion of the article extend around the long sides of said string.

2. (Amended) An absorbent article according to the claim 1, wherein the string comprises a rear portion of a longitudinally extending strip of flexible material that has a high coefficient of friction with respect to textile material and which extends in the front and the rear portion of the article and is fastened to the backing sheet on the side thereof that lies distal from the absorbent body.

3. (Amended) An absorbent article according to claim 1, wherein those portions of the article which, in the rear portion of said article, extend around the long sides of the string of strip material abut one another and are fastened to each other in at least one place.

4. (Amended) An absorbent article according to claim 2, wherein the strip of flexible material is an elastic foam material.

5. (Amended) An absorbent article according to claim 4, wherein the elastic foam material is mounted in the rear portion of the article in a stretched state and in the front portion of the article in a relaxed state.

6. (Amended) An article according to claim 4, wherein mutually adjacent portions of the material in the string of strip material are fastened to each other in at least one place.

7. (Amended) An article according to claim 2, wherein the strip extends symmetrically on both sides of the longitudinal symmetry axis (A-A) of the article and has in the front portion of said article a width which is greater than half the smallest width of the article in its front portion.

8. (Amended) A method of manufacturing an absorbent article which comprises a front portion and a rear portion and which includes a longitudinally extending elevated section in its rear portion, the method comprises;

- (a) placing a body of absorbent material on a first sheet of liquid-impermeable material;
- (b) placing on the body of absorbent material a second sheet of liquid-impermeable material, and joining together the first and second sheets in those parts of the sheets that extend beyond the body of absorbent material, therewith forming a generally flat composite body,
- (c) placing on the second sheet of the composite body a strip of flexible material that extends over at least a part of a front and a rear portion of the composite body;
- (d) fastening the strip to the second sheet in the front portion of the composite body;
- (e) forming that part of the strip which extends in the rear portion of the composite body into a longitudinally extending string; and

(f) folding those parts of the composite body that lie on respective sides of the longitudinal string of strip material in around said string and fastening said parts together in at least one place.

9. (Amended) A method according to claim 8, wherein the strip is comprised of an elastic material, and the part of said strip that extends in the rear portion of the composite body is stretched prior to carrying out step (f).

10. (Amended) A method according to claim 8, wherein the longitudinally extending strip is shaped by folding or rolling the strip together.

11. (Amended) A method according to Claim 8, wherein by fastening the parts of the composite body that have been folded-in on respective sides of the longitudinal string of strip material to said string in at least two longitudinally spaced sections that extend around the string circumference.

12. (Amended) A method according to claim 8, wherein forming that part of the strip which extends in the rear portions of the composite body into a longitudinally extending strip prior to placing the strip on the composite body.

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REMARKS

The foregoing amendments are made to place the claims in the preferred U.S.
format and to remove multiple claim dependencies.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: William C. Rowland
William C. Rowland
Registration No. 30,888

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

Date: March 7, 2002

Application No. Unassigned
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Page 1

Attachment to Preliminary Amendment dated March 7, 2002

Marked-up Claims -

1. (Amended) An absorbent article [in the form of a sanitary napkin, a panty liner or an incontinence protector and] comprising a front portion, a rear portion, a liquid-permeable top sheet [(2)], a liquid-impermeable backing sheet [(3)], and an absorbent body [(1)] enclosed between the top and backing sheets, wherein the rear portion of the article includes a longitudinally extending ridge-shaped elevation [(9)] that projects out from [that] the side of the article that contains the top sheet,

[characterised in that] wherein a central string of material [(8)] extends in the rear portion of the article; and [in that]

the top sheet [(2)], the backing sheet [(3)] and the absorbent body [(1)] enclosed therebetween in the rear portion of the article extend around the long sides of said string.

2. (Amended) An absorbent article according the claim 1, [characterised in that] wherein the string [(8)] comprises a rear portion of a longitudinally extending strip [(6)] of flexible material that has a high coefficient of friction with respect to textile material and which extends in the front and the rear portion of the article and is fastened to the backing sheet [(3)] on [that] the side thereof that lies distal from the absorbent body [(1)].

3. (Amended) An absorbent article according to claim 1 [or 2], [characterised in that] wherein those portions of the article which, in the rear portion of said article,

Attachment to Preliminary Amendment dated March 7, 2002

Marked-up Claims -

extend around the long sides of the string [(8)] of strip material abut one another and are fastened to each other in at least one place.

4. (Amended) An absorbent article according to claim [1,] 2 [or 3], [characterised in that] wherein the strip [(6)] of flexible material is an elastic foam material.

5. (Amended) An absorbent article according to claim 4, [characterised in that] wherein the elastic foam material is mounted in the rear portion of the article in a stretched state and in the front portion of the article in a relaxed state.

6. (Amended) An article according to [any one of claims 4-5] claim 4, [characterised in that] wherein mutually adjacent portions of the material in the string [(8)] of strip material are fastened to each other in at least one place.

7. (Amended) An article according to [any one of the preceding claims] claim 2, [characterised in that] wherein the strip [(6)] extends symmetrically on both sides of the longitudinal symmetry axis (A-A) of the article and has in the front portion of said article a width which is greater than half the smallest width of the article in its front portion.

Attachment to Preliminary Amendment dated March 7, 2002

Marked-up Claims -

8. (Amended) A method of manufacturing an absorbent article which comprises a front portion and a rear portion and which includes a longitudinally extending elevated section in its rear portion, [wherein] the method comprises [the steps of]:
- (a) placing a body of absorbent material on a first sheet [that comprises a] of liquid-impermeable material;
 - (b) placing on the body of absorbent material a second sheet [that comprises] of liquid-impermeable material, and joining together the first and second sheets in those parts of the sheets that extend beyond the body of absorbent material, therewith forming a generally flat composite body,
[characterised by the further steps of]
 - (c) placing on the second sheet of the composite body a strip of flexible material that extends over at least a part of a front and a rear portion of the composite body;
 - (d) fastening the strip to the second sheet in the front portion of the composite body;
 - (e) forming that part of the strip which extends in the rear portion of the composite body into a longitudinally extending string; and
 - (f) folding those parts of the composite body that lie on respective sides of the longitudinal string of strip material in around said string and fastening said parts together in at least one place.

Attachment to Preliminary Amendment dated March 7, 2002

Marked-up Claims -

9. (Amended) A method according to claim 8, [characterised in that] wherein the strip is comprised of an elastic material, and [in that] the part of said strip that extends in the rear portion of the composite body is stretched prior to carrying out step (f).

10. (Amended) A method according to claim 8 [or 9], [characterised in that] wherein the longitudinally extending strip is shaped by folding or rolling the strip together.

11. (Amended) A method according to Claim 8[,9 or 10], [characterised by] wherein by fastening the parts of the composite body that have been folded-in on respective sides of the longitudinal string of strip material to said string in at least two longitudinally spaced sections that extend around the string circumference.

12. (Amended) A method according to [any one of claims 8-11] claim 8, [characterised by] wherein forming that part of the strip [(29)] which extends in the rear portions of the composite body [(3)] into a longitudinally extending strip [(32)] prior to placing the strip [(29)] on the composite body [(30)].

A SANITARY NAPKIN WHOSE REAR PORTION INCLUDES A LONGITUDINALLY EXTENDING RIDGE

FIELD OF INVENTION

5 The present invention relates to an absorbent article in the form of a sanitary napkin, a panty liner or an incontinence protector that has a front and a rear portion and which includes a liquid-permeable top sheet, a liquid-impermeable backing sheet, and an
10 absorbent body enclosed between said top sheet and backing sheet, wherein the rear portion of the article has a longitudinally extending projecting part that projects out in the form of a ridge from that side of the article which includes the top sheet. The invention also relates to a method of manufacturing such an article.

BACKGROUND OF THE INVENTION

15 Sanitary napkins whose rear portions include ridge-like elevated parts are known to the art, for instance from US-A-4,673,403, US-A-4,804,380 and US-A-4,846,824. The raised ridge-like parts are well adapted to the female anatomy and therewith reduce the risk of menstruation fluid running along the upper side of the napkin to the edges thereof and
20 therewith soiling the undergarments of the wearer. The ridge-like parts also prevent fluid/liquid running backwards when the wearer lies on her back. When wearing such a napkin, the ridge-like part extends between the buttocks of the wearer, therewith causing the napkin to be held safely in position and preventing the napkin from slipping to one side in use. In the case of the known napkins, the ridge-like raised part is either obtained by
25 bending the absorbent body into a longitudinally extending fold and then fastening together those parts of the backing sheet that abut one another in the fold in one or more places, or by including a profiled insert in the absorbent body. When folding the absorbent body in accordance with the first-mentioned method, the absorbent body is liable to break or be thinned out along the fold, therewith impairing the liquid transport properties of the body.
30 The inclusion of an insert complicates the manufacture of the napkin.

2 (amended 2001-10-15)

The present invention aims to provide an absorbent article of the aforesaid kind in which the ridge-like part curves gently and has been produced without including an insert in the absorbent body.

5 SUMMARY OF THE INVENTION

These objects are achieved in accordance with the invention with an absorbent article in the form of a sanitary napkin, a panty liner or an incontinence protector which includes a front portion, a rear portion, a liquid-permeable top sheet, a liquid-impermeable backing sheet,
10 and an absorbent body or pad enclosed between the top sheet and backing sheet, said article having in its rear portion a longitudinally outstanding part which extends in the form of a ridge from that side of the article that includes the top sheet, said article being characterised in that a central string of material extends in the rear portion of the article, and in that ; and in that the top sheet, the backing sheet and the absorbent body enclosed therebetween in the
15 rear portion of the article extend around the long sides of said string. Folding of the absorbent body around a string of material results in a gently rounded ridge-like elevation.

In one preferred embodiment of the invention, the string comprises a rear portion of a longitudinally extending strip of flexible material that presents a high coefficient of friction
20 to textile material and which extends in the front and the rear portions of the article and is attached to the backing sheet on that side thereof distal from the absorbent body. This ensures that the front portion of the article will not move relative to the undergarments of the wearer when the article is in use.

25 Those parts of the article which extend around the long sides of the string of tape material extending in the rear portion of the article abut with and are attached to each other in at least one place. The strip of flexible material is preferably comprised of an elastic foam material which is mounted in a stretched state in the rear portion of the article and in a relaxed state in the front portion of said article, wherewith mutually adjacent parts of the
30 string of strip material are fastened together in at least one place. The strip extends symmetrically on both sides of the longitudinal symmetry axis of the article and has in the front portion of said article a width which is greater than that of the rear portion of the article, in its front portion.

front portion of said article a width which is greater than half the smallest width of the article in its front portion.

The present invention also relates to a method of manufacturing an absorbent article which comprises a front portion and a rear portion that includes a longitudinally extending elevated portion, said method comprising the steps of:

- (a) placing a body of absorbent material on a first sheet of liquid-permeable material;
- (b) placing a second sheet comprised of liquid-impermeable material on the body of absorbent material and joining the first and the second sheets together at those parts thereof that lie outside the body of absorbent material, therewith forming a generally flat composite body,
- characterised by the further steps of
- (c) placing a strip of flexible material on the second sheet of said composite body and causing said strip to extend over at least a part of a front and a rear portion of the composite body;
- (d) fastening the strip to said second sheet in the front portion of the composite body;
- (e) forming a longitudinally extending string from that part of the strip which extends in the rear portion of the composite body; and
- (f) folding those parts of the composite body lying on respective sides of the longitudinal string inwardly around said string and fastening said body parts together in at least one place.

In a preferred embodiment of the invention, said strip is comprised of elastic material and the part of the strip that extends in the rear portion of the composite body is stretched prior to carrying out step (f). The longitudinally extending string is formed by folding or rolling the strip together and fastening those parts of the composite body folded in on respective sides of the longitudinal string of strip material to said string in at least two sections which are mutually spaced apart in the longitudinal direction and which extend around the circumference of the string. In one variant, the part of the strip that extends in the rear portion of the composite body is formed into a longitudinally extending string before the strip is placed on the composite body.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described with reference to the accompanying drawings, in which

5

Fig. 1 is a schematic perspective plan view of a sanitary napkin according to one embodiment of the invention;

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Fig. 2 is a schematic perspective illustration of the sanitary napkin in Figure 1 taken from beneath;

Fig. 3 is a cross-sectional view taken on the line III-III in Figure 1;

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Figs. 4A, B-7A, B illustrate schematically different steps in the manufacture of an inventive sanitary napkin;

Fig. 8 illustrates schematically a method of folding a rear portion of a friction-enhancing layer fastened to the napkin of Figures 4-7;

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Fig. 9 is a schematic illustration of a production line for the manufacture of an inventive sanitary napkin;

Fig. 10 illustrates schematically part of the arrangement shown in Figure 9; and

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Fig. 11 illustrates schematically a further method of manufacturing an inventive sanitary napkin.

DESCRIPTION OF EMBODIMENTS

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Figures 1-3 illustrate a sanitary napkin according to a preferred embodiment of the invention. The napkin includes conventionally an absorbent body or pad 1 enclosed between two casing sheets, i.e. a top sheet 2 and a backing sheet 3. The top sheet and the

backing sheet are joined together, e.g. glued or heat-welded, in those sheet parts that externally surround the absorbent body. The napkin also includes on respective sides of its longitudinal symmetry line two compression lines 4, 5 that extend along a major part of the length of the napkin and equidistantly from respective long edges thereof.

5

The top sheet 2 is comprised of a liquid-permeable material, preferably nonwoven material although other materials may be used, such as perforated plastic film, for instance a thermoplastic material such as polyethylene. The nonwoven sheet may consist of natural fibres, such as cellulose or cotton fibres, or may consist of synthetic fibres, such as polyethylene, polypropylene, polyester, polyurethane, nylon or regenerated cellulose fibres. Alternatively, the top sheet may comprise a lamination. The material in the top sheet is preferably hydrophobic or has been treated so as to obtain a hydrophobic surface. It will be understood that the invention is not restricted to the use of said materials and that all materials that are used as top sheet material in absorbent articles may be used in the top sheet 2.

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The backing sheet 3 is comprised of a liquid-impermeable material, preferably plastic film produced from polyethylene, polypropylene or polyester. The backing sheet may also conveniently be microporous, i.e. will allow air and vapour to pass through but not liquid. The backing sheet may alternatively consist of a liquid-permeable material that has been coated with plastic, resin or some other liquid-impervious material. The backing sheet may be given a textile-like feeling, by forming said sheet from a lamination of nonwoven and liquid-impervious material, said nonwoven sheet being faced outwards. All materials used in the backing sheets of absorbent articles can be used in the present context.

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The absorbent body 1 is preferably comprised of cellulose fluff, although other materials used for absorbent bodies in absorbent articles can be used in an absorbent body according to the invention. The absorbent body may comprise one or more layers of absorbent material, wherewith so-called superabsorbent material can be mixed in one or more of the layers, and it is also conceivable to form the whole of the lowermost layer in a multilayer absorbent body from superabsorbent material, i.e. the layer that lies proximal to the backing sheet. The absorbent body 1 of the illustrated embodiment comprises a single sheet

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of cellulose pulp that has been compressed to a density of $0.1-0.2 \text{ g/cm}^3$. The cellulose pulp may exist in the form of rolls, bales or sheets that are dry-defibred and converted in a fluffed state to a pulp mat, sometimes while mixing-in so-called superabsorbents, i.e. polymers that are able to absorb liquid in an amount corresponding to several times their own weight. Other materials that can be used are different types of natural fibres, such as cotton fibres, peat fibres or the like. Synthetic absorbent fibres may also be included in the absorbent body.

According to the invention, a strip 6 of flexible material that has a high coefficient of friction with respect to textile material is fastened to the underside of the napkin, e.g. glued thereto. That part of the strip extending in the front portion 7 of the napkin is open to its full width, whereas the rear portion of the strip 6 is folded or rolled together to form a string 8 that extends along the longitudinal symmetry line A-A of the napkin. The rear portion of the napkin is folded around the string 8 and fastened thereto, e.g. glued. This results in a ridge-like elevation 9 on the upper side of the napkin, i.e. the side that is intended to lie in contact with the wearer's body. In the illustrated embodiment, the rear portion of the napkin is folded around the full periphery of the string 8 along a string section and the folded parts of the napkin are fastened together along this section, i.e. by gluing or welding, as will be seen from Figures 2 and 3.

When donning the illustrated napkin, the napkin is positioned so that the ridge-like elevation 9 will partially extend between the wearer's buttocks. This provides good protection against rearward leakage. The ridge-like elevation 9 conforms effectively to the female anatomy in other respects and therewith contributes in greatly reducing the risk of liquid running along the upper surface of the napkin and out to the edges thereof. The ridge-like elevation 9 also prevents the napkin from moving sideways as the wearer moves. When the napkin is worn, the front portion 7 of the strip 6 lies against the wearer's undergarments and prevents the front portion of the napkin moving relative to said garments as a result of frictional forces. A sanitary napkin constructed in this manner does not therefore require the provision of an adhesive layer on the backing sheet in order to fasten the napkin to the undergarments of the wearer, since the napkin is held securely in place by the ridge 9 and the friction strip 6.

Because the ridge-like elevation is formed by folding the absorbent body 1 and its casing sheets 2, 3 around the string 8, the ridge 9 obtains a gently curved cross-sectional shape. The width of the ridge can be varied in many ways, for instance by varying the width of the rear portion of the strip 6 or by varying that part of the periphery of the string 8 that is embraced by the absorbent body 1. As will be seen from Figures 1 and 2, the ridge 9 is broader in those sections in which the backing sheet 3 is not fastened to the string 8 around the whole of its circumference.

In the illustrated embodiment, the strip 6 is produced from an elastic plastic foam material, preferably foamed polyethylene that has open cells, although other foam materials may be used, such as viscous foam, polyacrylate foam, polyester foam or polystyrene foam having open cell structures. It is preferred to stretch the string 8 before the rear portion of the napkin is folded around the string, and to keep the string stretched as the portion of the napkin folded around said string is fastened thereto. The elastic string tends to return to its pre-stretched state and will therefore contract when the load on the finished napkin is removed. The ridge 9 will therewith obtain a somewhat curved shape in its longitudinal direction, this curvature depending on the extent to which the string 8 is stretched prior to attaching the rear portion of the napkin thereto. The cross-sectional area of the string will decrease somewhat as the string 8 is stretched.

One embodiment of a method of manufacturing a sanitary napkin in accordance with the invention will now be described with reference to Figures 4-8.

The sanitary napkin is preferably manufactured continuously, by placing a row or line of absorbent bodies on a travelling first web of material. A second web of material is then placed on top of the absorbent bodies so as to form a composite web consisting of two casing sheets and intermediate absorbent bodies. Individual napkins, which are still not provided with friction strips, are then cut from the composite web.

Figures 4A, B-7A, B illustrate the various steps in the final stages of the method of providing a sanitary napkin with a ridge-like elevation, as seen in plan view with the

backing sheet facing towards the viewer and in side view seen from the rear short side of the napkin respectively. Those components of the napkin shown in Figures 4A, B-7A, B that find correspondence in components shown in Figures 1-3 have been identified with the same reference signs to which a prime has been added.

5 In a first step (Figs. 4A; B), a strip 6 of foam material is placed on the backing layer 3' of the napkin cut from said composite web and the strip 6' is fastened to the backing sheet 3' in the front portion of the napkin, within the distance reference *a* in Figure 4A. The strip is preferably glued to said sheet, although it may also be welded thereto, e.g. spot-welded.
10 The strip is not fastened to the backing sheet in the rear portion of the napkin within the distance identified by reference *b* in Figure 4A.

In the second step of the final stage (Figs. 5A, B, 6A, B) the strip 6' is stretched in the rear portion of the napkin and its side-edges folded in towards each other.

15 The resultant string 8' is then folded into an inverse S-shape, as shown schematically in Figure 8 and is compressed so that the folded parts of said string 8' will lie in abutment with one another.

20 Finally (Fig. 7A, B), the absorbent body 1' in the rear portion of the napkin is folded around the string 8' and fastened thereto. The absorbent body is folded around the full circumference of the string 8' within one section thereof, and those parts of the backing sheet 3' which are therewith brought into mutual abutment are fastened together in this string section. The string will therewith be fully embraced by the absorbent body within
25 said string section, thereby preventing the string 8' of elastic material from changing its shape in said string section as a result of its inherent spring forces.

As will be understood, it is not necessary for the rear portion of the napkin to include a section in which the string 8' is fully embraced by the absorbent body and that the string 8'
30 can be prevented from departing from its compressed state, by virtue of its intrinsic spring force, and from taking a more extended state, by fastening the compressed parts of the string 8' together locally, e.g. at the beginning of the string and at its free end or in an

intermediate portion of said ends. However, it is preferred to sustain the string in a compressed state with the aid of absorbent body sections folded around said string, since this obviates the need of applying glue to the string and therewith significantly facilitates manufacture of the napkin.

Figure 9 is a schematic illustration of an inventive napkin production line.

A web 10 of top sheet material, e.g. nonwoven material, is unwound from a storage reel 11 and transported on a transporter (not shown), e.g. a vacuum transporter, to the right in Figure 10, as indicated with an arrow. A device 12 for laying a row of line of absorbent bodies 13 on the web 10 is positioned downstream of the reel 11. Downstream of the device 12 is a second storage reel 14 from which a second web 15 comprising backing material is unwound and placed on the line of absorbent bodies 13. The composite web consisting of the two webs 10, 15 and the absorbent bodies 13 is then passed through a device 16 located downstream of the device 14 and functioning to fasten the webs 10, 15 together at parts which lie externally of the bodies 13. The webs 10, 15 are preferably glued together, wherewith the glue is conveniently applied to the web 15 immediately said web is placed over the absorbent bodies 13. The webs may alternatively be welded together, e.g. by ultrasound welding. The composite web then passes through a cutting or punching device 17 in which individual absorbent articles 18 are cut or punched from the composite web. The components described hitherto are typical in production lines for sanitary napkins and like articles, as are also other components, for instance such as further devices for laying bodies on top of the absorbent bodies 13 to form multilayer absorbent bodies, or means for providing the napkin with compression lines or elastic elements, all of which may be included in the production line.

Located downstream of the punch 17 is a device 19 for applying and fastening a strip of plastic foam material 20 to the backing sheet 15 of each article 18 cut from the composite web. The articles 18 and a strip-forming web of material 20 taken from a storage reel (not shown) are passed through the nip of a pair of rolls 21, 22 in the device 19. Prior to entering the roll nip, the web 20 is provided intermittently with a glue layer on parts of the side facing towards the article 18, with the aid of an intermittently operating glue

applicator 23. The web 20 and the articles 18 fastened thereon are then passed to a transfer wheel 24 which has a higher peripheral speed than the roll 22. Those parts of the web 22 on which no articles 18 are fastened will thereby be stretched and the spacing between the articles 18 therewith increased. Located downstream of the transfer wheel 24 is a device 25 in which those sections of the web in which no articles 18 are fastened are folded together in the manner shown in Figures 4A-6B and Figure 8, so as to form a string. The web 20 and appendant articles 18 then pass through a device 26 in which parts of the articles 18 are folded-in around the formed string and fastened thereto in the manner shown in Figures 7A, B. After exiting from the device 26, the web 20 and the articles 18 fastened thereto pass through a cutting or punching device 26 in which individual napkins provided with ridge-like elevations are cut-out.

In the described arrangement, the articles 18 are fully symmetrical in shape, such that the front and rear portions of the articles are of similar shape, and glue is applied in the device 19 so that mutually facing ends of the articles 18 will be either rear portions or front portions of the napkin. As illustrated schematically in Figure 10, the device 25 may include two sets of hinged folding plates 27, 28 that can be folded to a compressed S-shape and can be moved relative to each other in the direction of web movement and also relative to the conveyor (not shown) on which the web 20 and its appendant articles are transported. The devices 25, 26 can move reciprocatingly relative to the line of articles, which are moved with the aid of a conveyor (not shown). In a first position, the folding plates 27, 28 are placed adjacent each other and immediately upstream of the section a' of the strip-like web 20 fastened to the backing sheet of the front portion of an article 18'. The folding plates are then moved in the direction of movement R of the articles 18', 18'' at the same speed as said articles, and the web 20 is folded into an S-shape locally, by folding together the plates 27, 28. When folding of the plates is finished, the plate 28 is moved in the upstream direction relative to the plate 27 and gives the web 20 an S-shape during its upstream movement. The plate 28 is moved in the upstream direction to a point slightly spaced from that part a'' of the section of web 20 fastened to the article 18''. The articles 18', 18'' will now be situated in the device 26, and the mutually opposing rear portions of the articles 18', 18'' are folded around the formed string 8'' and fastened thereto. As the rear portions of the articles 18', 18'' are folded-in, the devices 25, 26 move in the movement direction R

at the same speed as the web 20 and the articles 18', 18". The devices 25, 26 are then moved back in the upstream direction, so as to be positioned correctly for forming strings in subsequent pairs of articles 18 in the process line.

5 One variant of the described embodiment of a method of manufacturing sanitary napkins in accordance with the invention is shown schematically in Figure 11. This variant differs from the earlier described method by virtue of applying the strip-like web 29 to the web 30 of napkin blanks 31 in a ready-folded shape, said blanks each comprising an absorbent body enclosed between a top sheet and a backing sheet. The strings 32 of strip-like material
10 have thus already been produced when the web 29 of strip-like material is placed on the web 30. In the variant shown in Figure 11, the web 30 is comprised of a coherent line of napkin blanks 31. The web 30 of napkin blanks is produced conventionally, e.g. in a process line in accordance with the line described with reference to Figure 9, although without the short sides of the blanks 31 being cut-out during passage through the cutting or
15 punching device in said process line. The web of backing material faces towards the viewer in Figure 11.

Prior to applying the web 29 of strip-like material to the web 30 of napkin blanks, the web 30 is provided with a glue string 38 that has a width corresponding to the greatest width of
20 the web 29 and that extends symmetrically on respective sides of the longitudinal symmetry line of the web 30. When glue is applied, the underside of the web 29, including the undersides of the string 32, will adhere to the web 30 of napkin blanks. When the web 29 has fastened to the web 30, the web 30 is folded around its longitudinal symmetry line, meaning that the web 30 located within the regions of the strings 32 will be folded around
25 said strings and fastened thereto and also to themselves. Individual napkins are then cut from the web, by mutually separating the short sides of mutually adjacent napkin blanks. Although not preferred, it is, of course, possible to cut individual napkin blanks from the web 30 prior to applying the web 29 thereto.

30 The sanitary napkins produced in this way are suitably packed in the aforesaid folded state, since it is easier to obtain a uniform product stack with the napkins in this form than if the napkins were first allowed to adopt their three-dimensional shape with an upstanding

curved ridge in their rear portions. Naturally, it is also possible to construct the device 26 in the way described with reference to Figures 9 and 10, so that the articles 18, 18' can be fully folded around their longitudinal symmetry axes and packed in a folded-up state.

- 5 The napkin blanks illustrated in Figure 11 include so-called wings which, when the napkin is used, are intended to be folded around the edges of the wearer's panties in order to prevent soiling of the garment. Such wings will, of course, add further security against lateral movement of a sanitary napkin relative to panties.
- 10 The aforescribed embodiments can, of course, be modified within the scope of the invention, particularly with respect to dimensions of the manufactured napkins. When a sanitary napkin intended for night use shall be produced, it may be appropriate to make the rear portion of the napkin wider than when a panty protector shall be produced. When the front and rear portions of the napkins have different shapes, it is necessary to modify the
- 15 described processes so that each alternate napkin in the napkin line will be turned so that the front and rear portions of the napkin lie adjacent to the front and rear portions of adjacent napkins, or the lengths of the strings of strip material must also be adapted to the length of the rear portions of the napkins, i.e. so that each string will extend solely over the rear end of a single napkin. The manufacturing arrangement may also include further
- 20 components, for instance when the napkin shall include a liquid dispersion layer between the top sheet and the absorbent body. The invention is therefore restricted solely by the contents of the accompanying Claims.

13 (amended 2001-10-15)

CLAIMS

1. An absorbent article in the form of a sanitary napkin, a panty liner or an incontinence protector and comprising a front portion, a rear portion, a liquid-permeable top sheet (2), a liquid-impermeable backing sheet (3), and an absorbent body (1) enclosed
5 between the top and backing sheets, wherein the rear portion of the article includes a longitudinally extending ridge-shaped elevation (9) that projects out from that side of the article that contains the top sheet, characterised in that a central string of material (8) extends in the rear portion of the article; and in that the top sheet (2), the backing sheet (3)
10 and the absorbent body (1) enclosed therebetween in the rear portion of the article extend around the long sides of said string.

2. An absorbent article according to Claim 1, characterised in that the string (8) comprises a rear portion of a longitudinally extending strip (6) of flexible material that has
15 a high coefficient of friction with respect to textile material and which extends in the front and the rear portion of the article and is fastened to the backing sheet (3) on that side thereof that lies distal from the absorbent body (1).

3. An absorbent article according to Claim 1 or 2, characterised in that those portions
20 of the article which, in the rear portion of said article, extend around the long sides of the string (8) of strip material abut one another and are fastened to each other in at least one place.

4. An absorbent article according to Claim 1, 2 or 3, characterised in that the strip (6)
25 of flexible material is an elastic foam material.

5. An absorbent article according to Claim 4, characterised in that the elastic foam material is mounted in the rear portion of the article in a stretched state and in the front
30 portion of the article in a relaxed state.

6. An article according to any one of Claims 4-5, characterised in that mutually adjacent portions of the material in the string (8) of strip material are fastened to each other in at least one place.

14 (amended 2001-10-15)

7. An article according to any one of the preceding Claims, characterised in that the strip (6) extends symmetrically on both sides of the longitudinal symmetry axis (A-A) of the article and has in the front portion of said article a width which is greater than half the smallest width of the article in its front portion.

8. A method of manufacturing an absorbent article which comprises a front portion and a rear portion and which includes a longitudinally extending elevated section in its rear portion, wherein the method comprises the steps of

(a) placing a body of absorbent material on a first sheet that comprises a liquid-permeable material;

(b) placing on the body of absorbent material a second sheet that comprises liquid-impermeable material, and joining together the first and second sheets in those parts of the sheets that extend beyond the body of absorbent material, therewith forming a generally flat composite body,

characterised by the further steps of

(c) placing on the second sheet of the composite body a strip of flexible material that extends over at least a part of a front and a rear portion of the composite body;

(d) fastening the strip to the second sheet in the front portion of the composite body;

(e) forming that part of the strip which extends in the rear portion of the composite body into a longitudinally extending string; and

(f) folding those parts of the composite body that lie on respective sides of the longitudinal string of strip material in around said string and fastening said parts together in at least one place.

9. A method according to Claim 8, characterised in that the strip is comprised of an elastic material; and in that the part of said strip that extends in the rear portion of the composite body is stretched prior to carrying out step (f).

10. A method according to Claim 8 or 9, characterised in that the longitudinally extending string is shaped by folding or rolling the strip together.

ABSTRACT

The present invention relates to an absorbent article in the form of a sanitary napkin, a panty liner or an incontinence protector and comprising a front portion, a rear portion, a liquid-permeable top sheet (2), a liquid-impermeable backing sheet (3), and an absorbent body (1) enclosed between the top and backing sheets, wherein the rear portion of the article includes a longitudinally extending ridge-shaped elevation (9) that projects out from that side of the article that contains the top sheet. According to the invention a central string of material (8) extends in the rear portion of the article and the absorbent body (1) between the top sheet (2) and the backing sheet (3) in the rear portion of the article extends around the long sides of said string. The invention also relates to a method of manufacturing such an article.

FIG.1



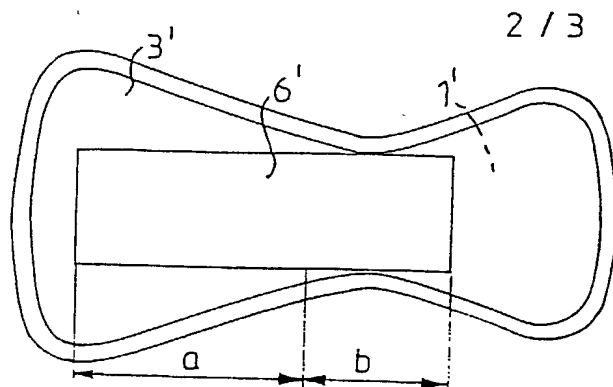


FIG. 4A

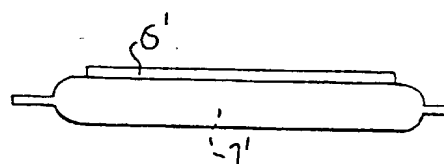


FIG. 4B

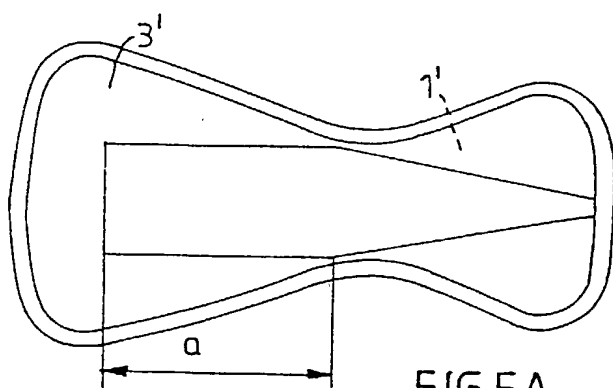


FIG. 5A

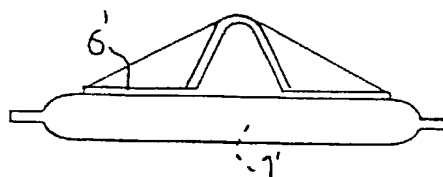


FIG. 5B

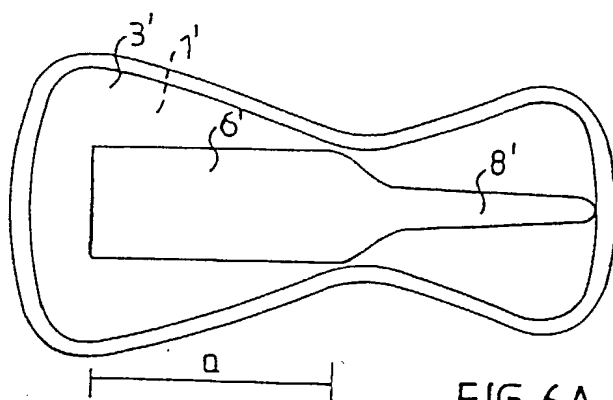


FIG. 6A

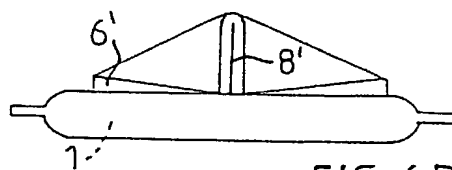


FIG. 6B

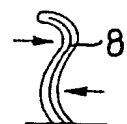


FIG. 8

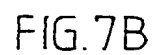


FIG.7A

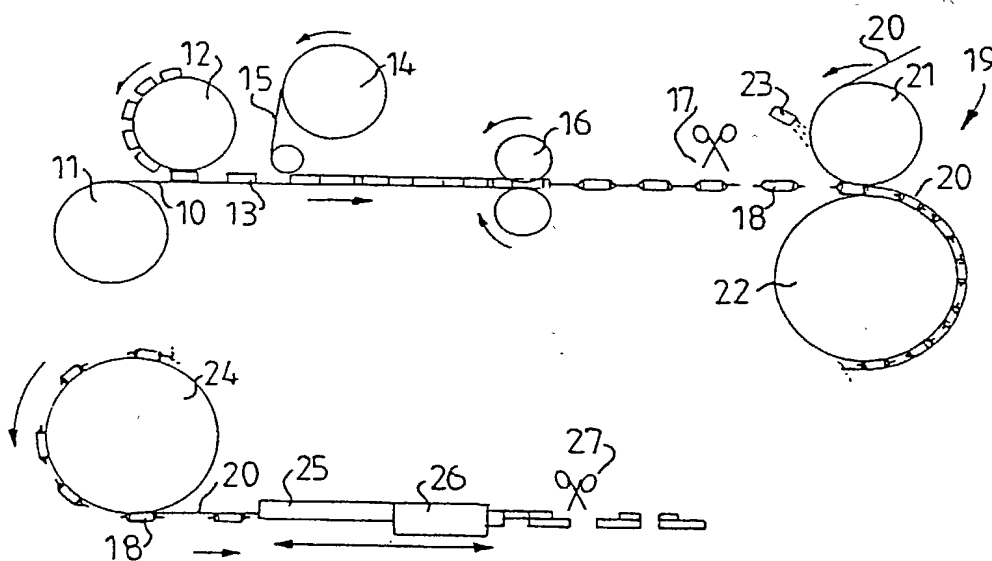


FIG. 9

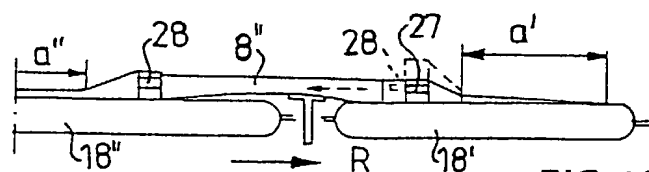


FIG. 10

000500-337

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As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

A SANITARY NAPKIN WHOSE REAR PORTION INCLUDES A LONGITUDINALLY EXTENDING RIDGE

the specification of which (check only one item below):

- ☐ is attached hereto.
- ☐ was filed as United States application
Number _____ on _____
and was amended _____ on _____ (if applicable).
- ☒ was filed as PCT international application
Number PCT/SE00/01720 on 06 September 2000
and was amended _____ on 15 October 2001 (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above

I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §§119 (a)-(d), 172 or 365 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

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COUNTRY (if PCT, indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. §§119, 172 or 365	
Sweden	9903203-9	09 September 1999	X Yes	No
			Yes	No
			Yes	No
			Yes	No
			Yes	No

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Combined Declaration and Power of Attorney
for Utility or Design Patent Application
Attorney's Docket No. 000500-337

Page 2 of 2

I hereby appoint the following attorneys and agent(s) to prosecute said application and to transact all business in the Patent and Trademark Office connected therewith and to file, prosecute and to transact all business in connection with international applications directed to said invention:

William L. Mathis 17,337
Robert S. Swecker 19,885
Platon N. Mandros 22,124
Benton S. Duffett, Jr. 22,030
Norman H. Stepno 22,716
Ronald L. Grudziecki 24,970
Frederick G. Michaud, Jr. 26,003
Alan E. Kopecki 25,813
Regis B. Sluter 26,999
Samuel C. Miller, III 27,360
Robert G. Mukai 28,531
George A. Hovanec, Jr. 28,223
James A. LaBarre 28,632
E. Joseph Gess 28,510
R. Danny Huntington 27,903

Eric H. Weisblatt 30,505
James W. Peterson 26,057
Teresa Stanek Rea 30,427
Robert E. Krebs 25,885
William C. Rowland 30,888
T. Gene Dillahunty 25,423
Patrick C. Keane 32,858
B. Jefferson Boggs, Jr. 32,344
William H. Benz 25,952
Peter K. Skiff 31,917
Richard J. McGrath 29,195
Matthew L. Schneider 32,814
Michael G. Savage 32,596
Gerald F. Swiss 30,113
Charles F. Wieland III 33,096

Bruce T. Wieder 33,815
Todd R. Walters 34,040
Ronni S. Jillions 31,979
Harold R. Brown III 36,341
Allen R. Baum 36,086
Brian P. O'Shaughnessy 32,747
Kenneth B. Leffler 36,075
Fred W. Hathaway 32,236
Wendi L. Weinstein 34,456
Mary Ann Dillahunty 34,576
Donna M. Meuth 36,607
Mark R. Kresloff 42,766



21839

and:

Address all correspondence to:

Ronald L. Grudziecki
BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, Virginia 22313-1404



21839

Address all telephone calls to: William C. Rowland at (703) 836-6620.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF SOLE OR FIRST INVENTOR	Ann SAMUELSSON
Signature	<i>Ann Samuelsson</i>
Date	25 February 2002
Residence (City, State, Country)	Lindome, Sweden SEX
Citizenship	Swedish
Mailing Address	Flintstenvägen 28
City, State, ZIP, Country	S-437 32 Lindome, Sweden

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